

7 天線增益之要求

7.1 適用標準

依據NCC低功率射頻電機技術規範4.7.3節之要求，

4.7.3.1 使用於5.15 GHz~5.25 GHz 頻段

(1) 供戶外操作使用：

(C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

(D) 在水平面仰角超過30 度時，其最大EIRP 應小於或等於21 dBm。

(2) 供室內操作使用：

(C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

(3) 供固定式點對點操作使用：

(C) 使用超過23 dBi方向增益之指向性天線時，應依超過23 dBi天線方向增益的dBi總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

(D) 固定式點對點操作，不包括點對多點系統、全方向性應用及多台共站發射機傳送相同資訊。

(4) 供用戶端裝置(Client Device)操作使用：

(C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

4.7.3.2 使用頻率於5.25 GHz~5.35 GHz 與5.470 GHz~5.725 GHz 頻段

(3) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

4.7.3.3 使用頻率於5.725 GHz~5.850 GHz 頻段

(3) 供固定式點對點操作時，使用方向增益超過6 dBi 之發射天線，可不需對應減少發射器之傳導輸出功率限制值。

(4) 除(3)外，使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

7.2 天線增益

此裝置使用天線如下，詳細規格請參考附件天線規格書。

天線型式	Supplier	Model No.	發射頻帶(MHz)	天線增益(dBi)
PCB	INPAQ	WA-P-LB-02-533	5250~5350	1.16
			5470~5725	2.71

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8 26DB & 6DB 頻寬之測試

8.1 適用標準

(1) 5.15 GHz~5.25 GHz、5.25 GHz~5.35 GHz 及 5.47 GHz~5.725 GHz 頻段，測試儀器之頻寬應設定為 1 MHz 頻寬或待測物之 26 dB 發射頻寬，兩者取較小者。

(2) 5.725 GHz~5.850 GHz 頻段，測試儀器之頻寬應設定為 500 kHz 或待測物之 26dB 發射頻寬，兩者取較小者。

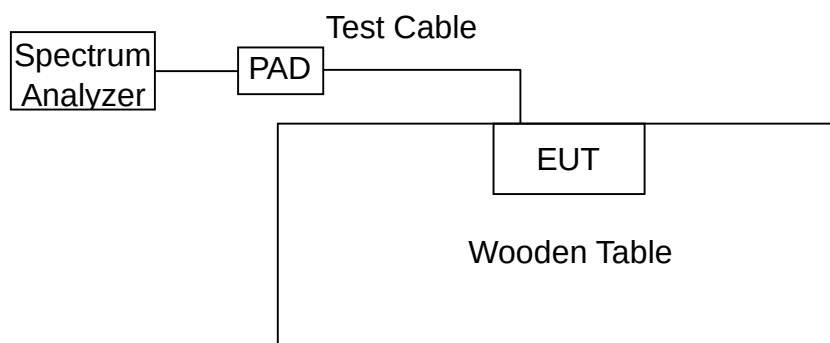
解析頻寬小於(1)或(2)時，應以補償方式計算總功率頻譜密度。

8.2 量測方法

將發射機之天線埠經由適當之衰減直接連至測試儀器。

設定儀器之解析頻寬為 100KHz, 視訊頻寬 $\geq$ 解析頻寬, 頻率掃描範圍(span)大於解析頻寬

8.3 測試配置



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8.4 量測結果

802.11a_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5260	24.3	13.856
5300	24.06	13.813
5320	28.27	14.513
5500	18.91	12.767
5580	27.84	14.447
5700	18.94	12.774
5720	29.98	14.768

802.11n_HT20_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5260	27.74	14.431
5300	27.33	14.366
5320	24.28	13.852
5500	19.76	12.958
5580	30	14.771
5700	19.8	12.967
5720	30	14.771

802.11n_HT40_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5270	46.45	16.670
5310	39.99	16.020
5510	39.75	15.993
5550	45.42	16.572
5670	40.34	16.057
5710	40.86	16.113

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802.11ac_VHT80_Ch0

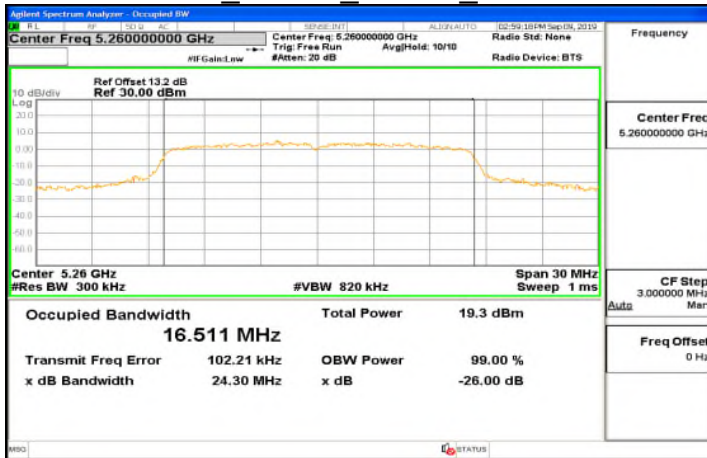
Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5290	82.71	19.176
5530	81.45	19.109
5610	81.51	19.112
5690	81.53	19.113

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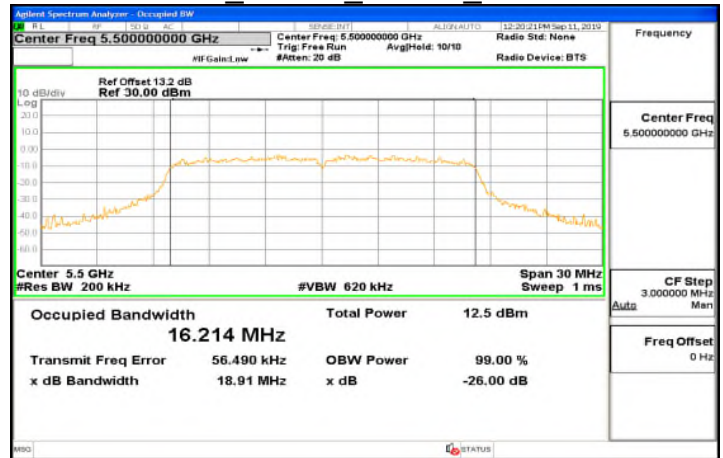
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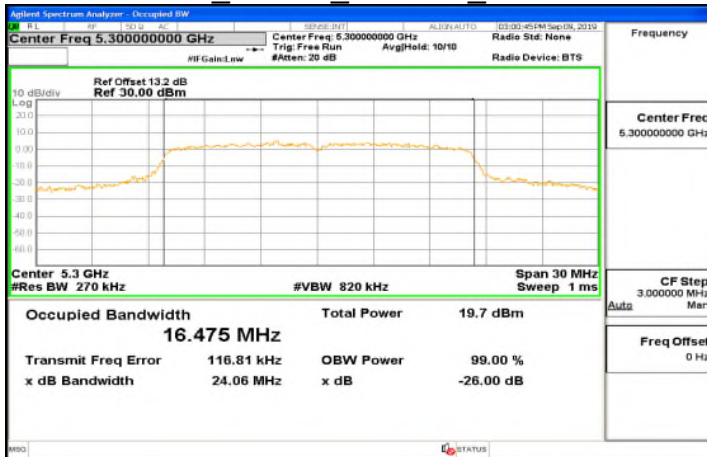
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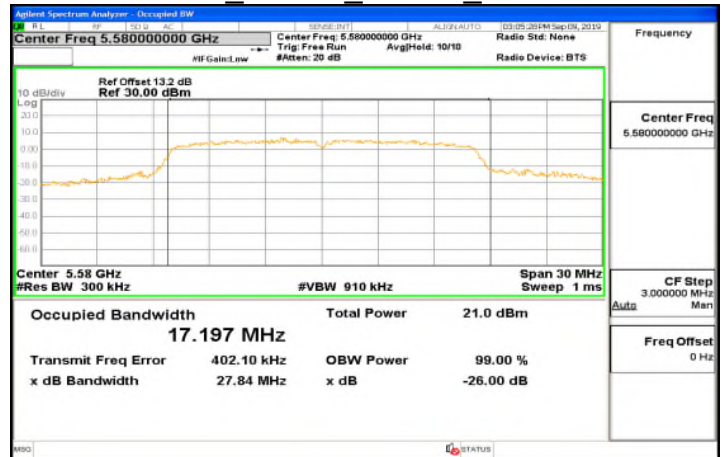
802.11a 20MHz Chain0 5500MHz



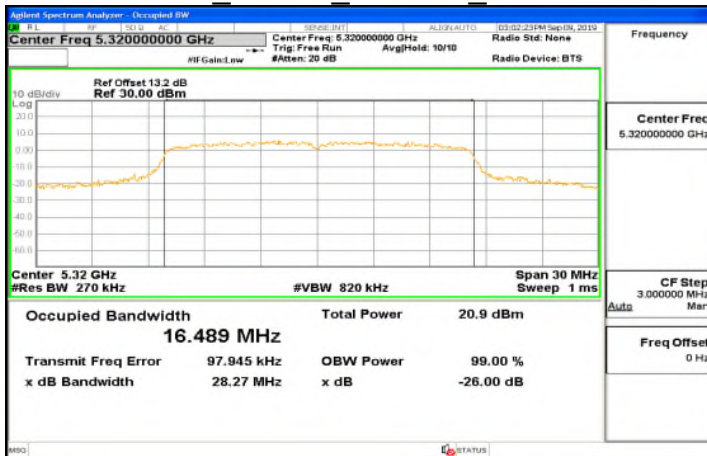
802.11a 20MHz Chain0 5300MHz



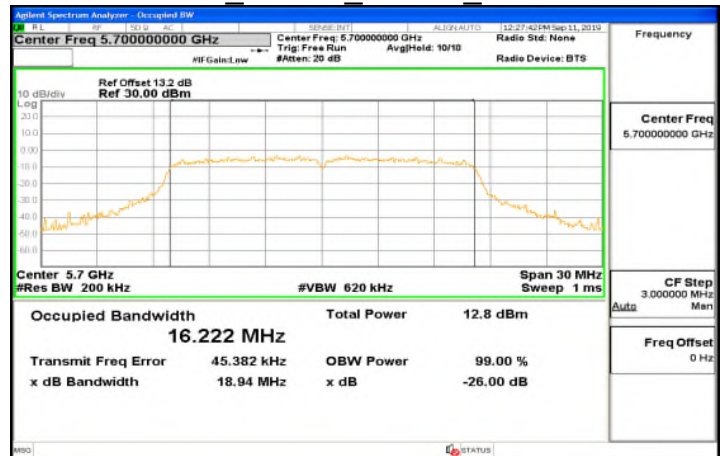
802.11a 20MHz Chain0 5580MHz



802.11a 20MHz Chain0 5320MHz



802.11a 20MHz Chain0 5700MHz



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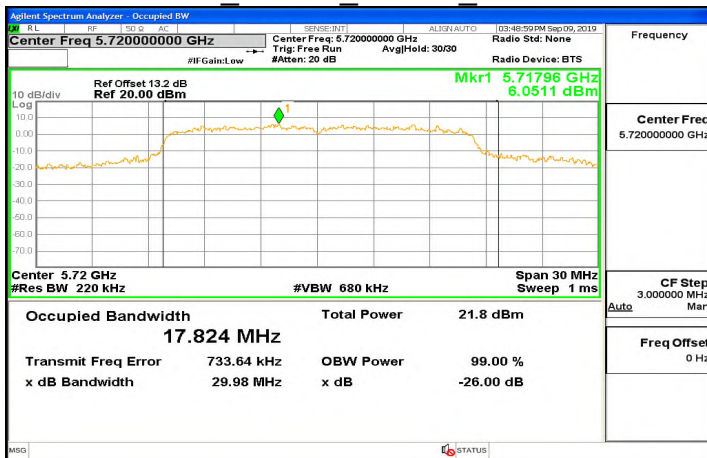
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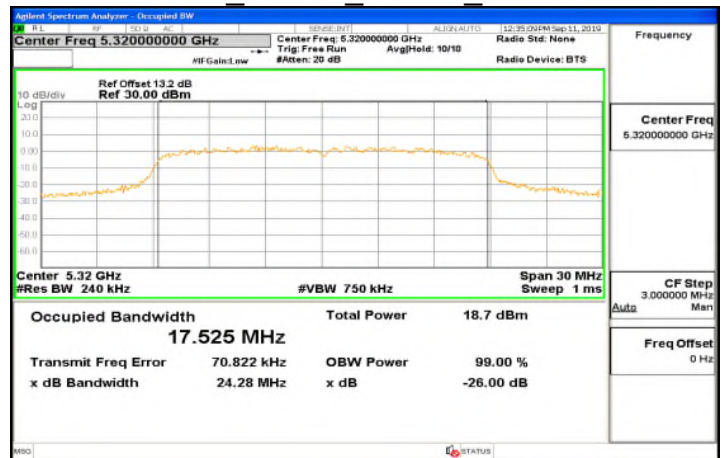
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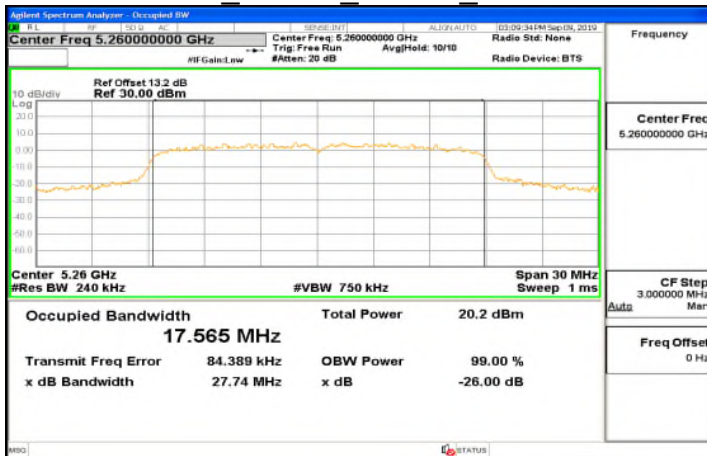
802.11a 20MHz Chain0 5720MHz



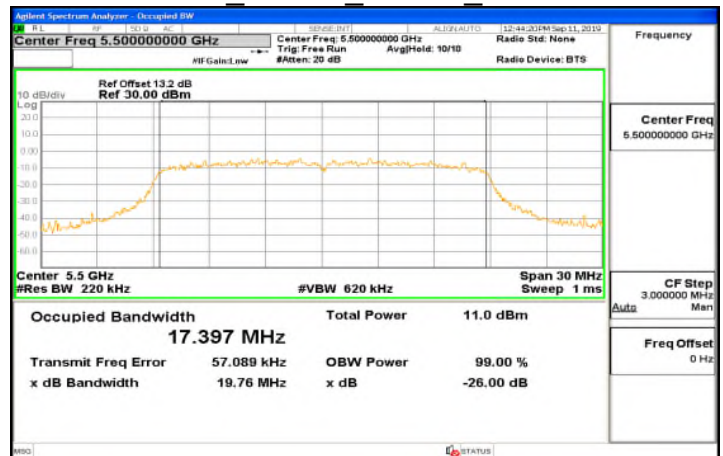
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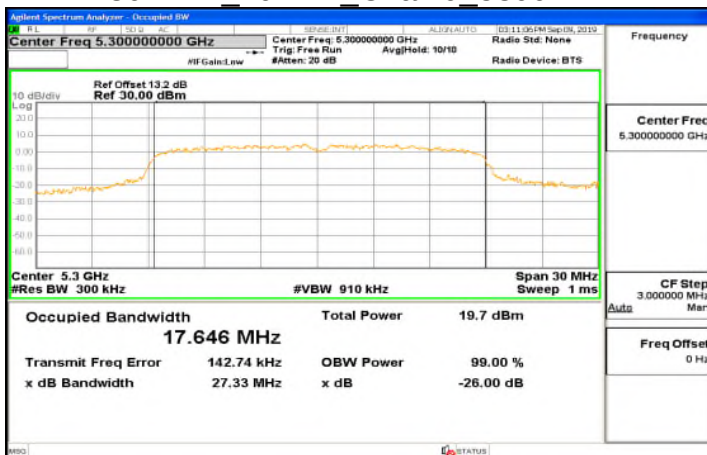
802.11n 20MHz Chain0 5260MHz



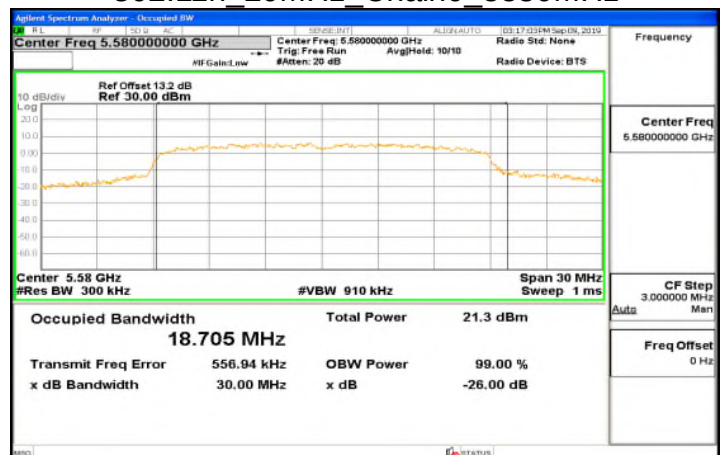
802.11n 20MHz Chain0 5500MHz



802.11n 20MHz Chain0 5300MHz



802.11n 20MHz Chain0 5580MHz



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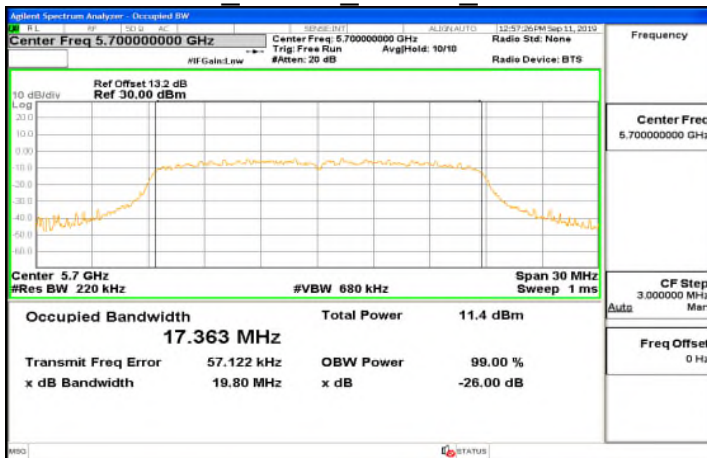
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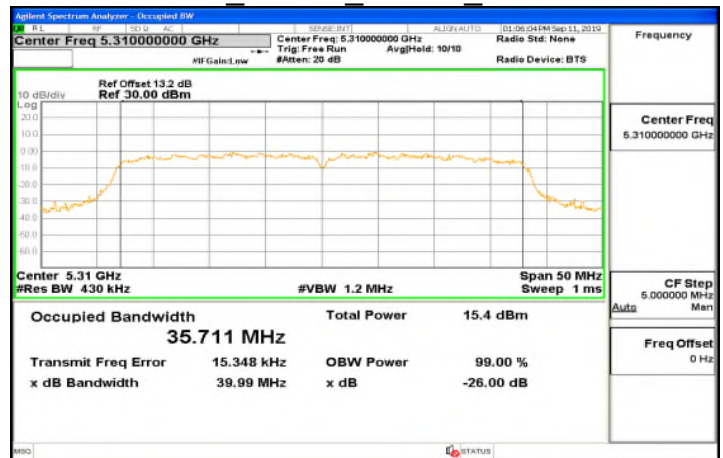
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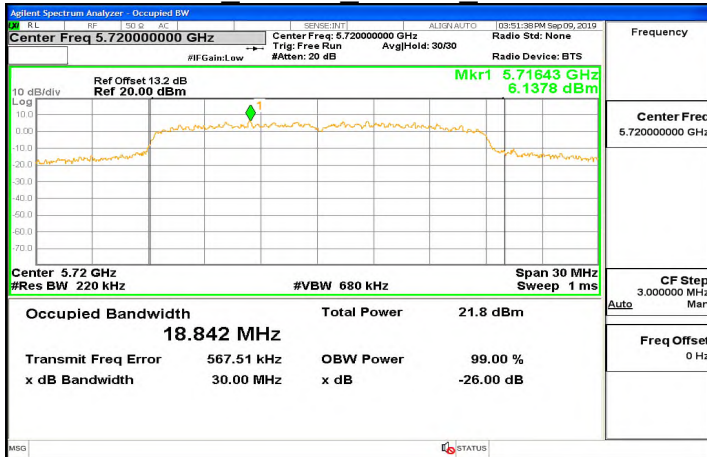
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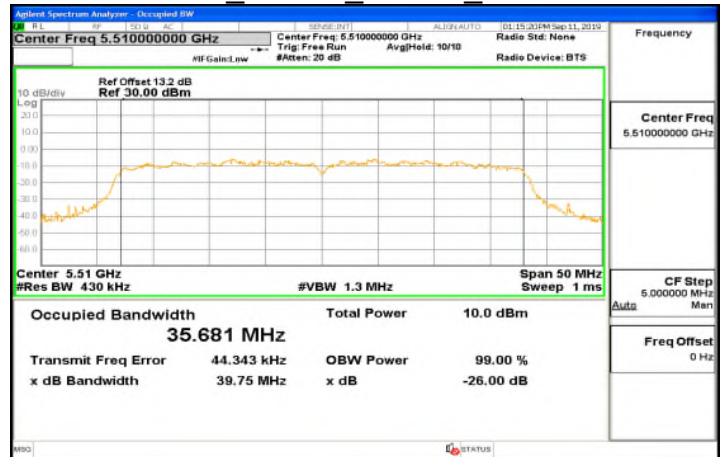
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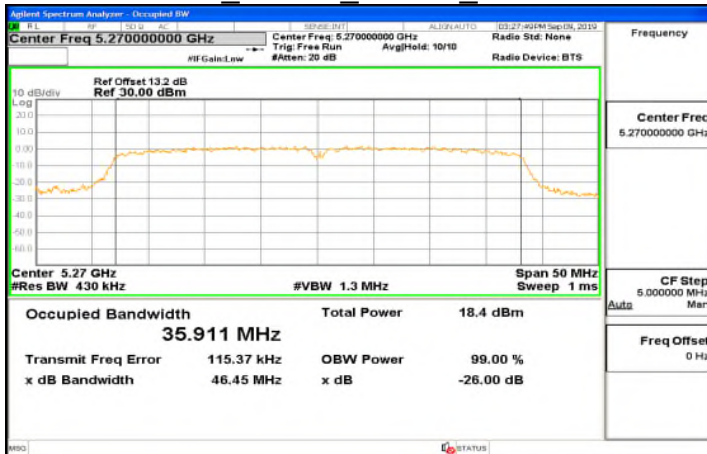
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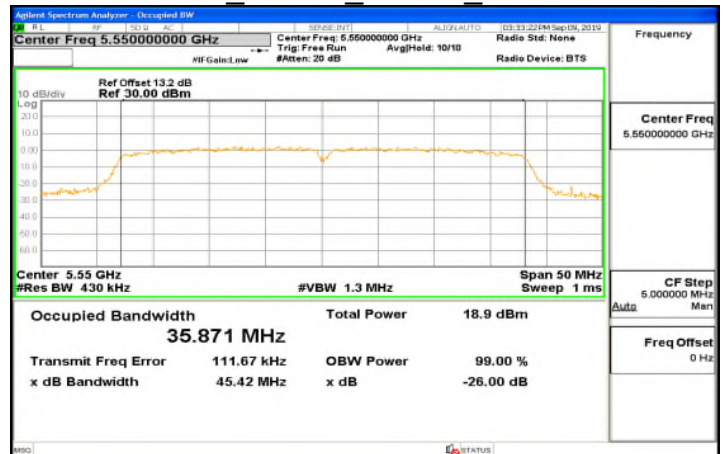
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802.11n 40MHz Chain0 5270MHz



802.11n 40MHz Chain0 5550MHz



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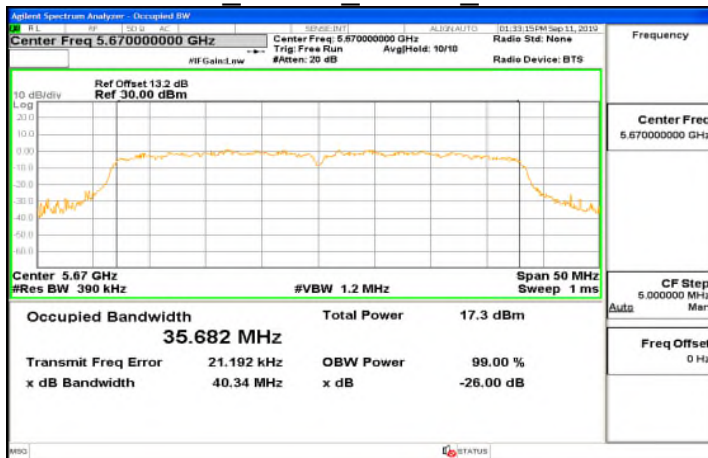
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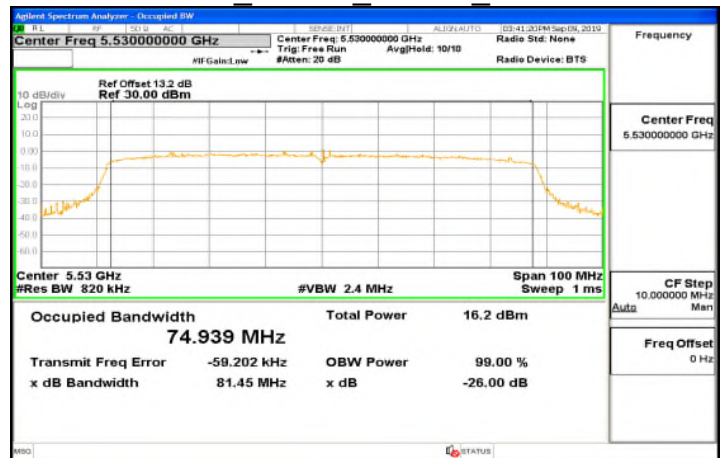
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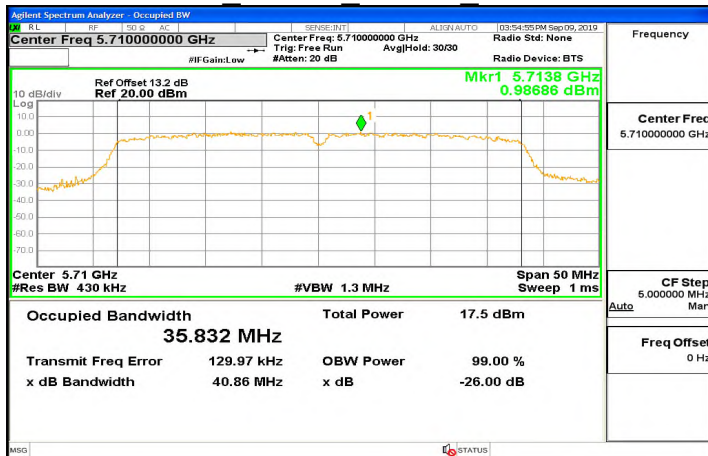
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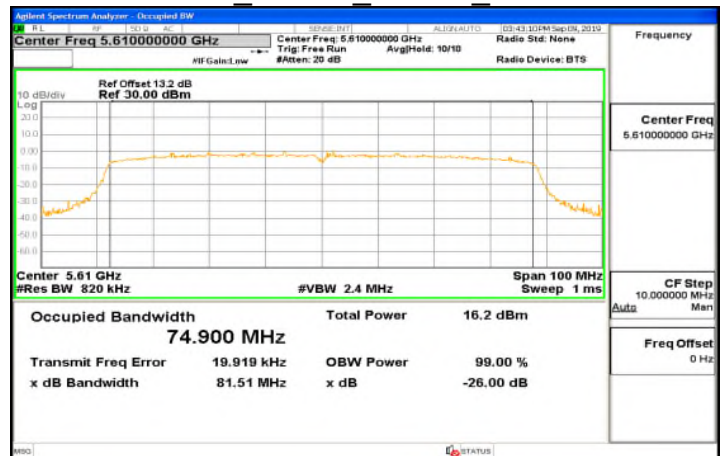
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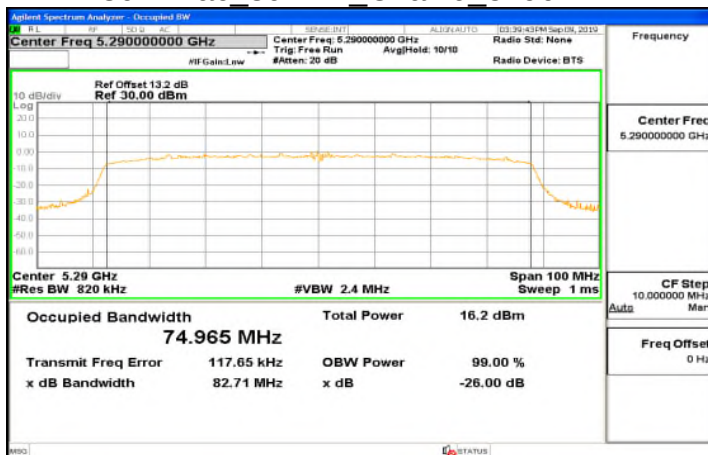
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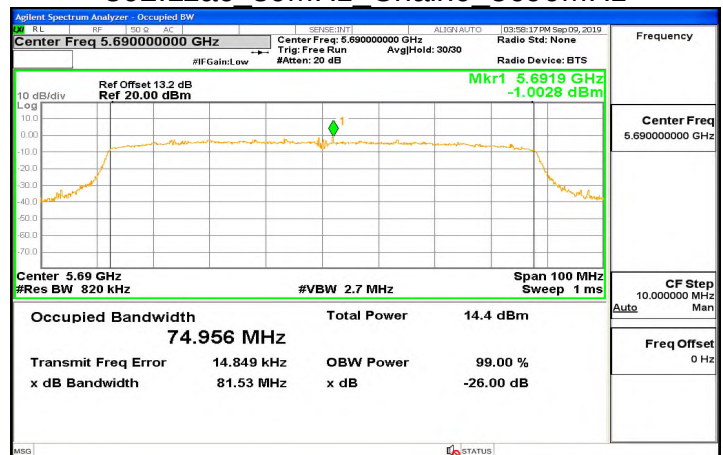
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802.11ac 80MHz Chain0 5290MHz



802.11ac 80MHz Chain0 5690MHz



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9 輸出峰值功率之量測

9.1 適用標準

依據NCC低功率射頻電機技術規範4.7.3節之要求，使用於5.15 GHz~5.25 GHz 頻段

(1) 供戶外操作使用：

- (A) 最大傳導輸出功率應小於或等於1 W。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於17 dBm。
- (C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。
- (D) 在水平面仰角超過30 度時，其最大EIRP 應小於或等於21 dBm。

(2) 供室內操作使用：

- (A) 最大傳導輸出功率應小於或等於1 W。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於17 dBm。
- (C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

(3) 供固定式點對點操作使用：

- (A) 最大傳導輸出功率應小於或等於1 W。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於17 dBm。
- (C) 使用超過23 dBi方向增益之指向性天線時，應依超過23 dBi天線方向增益的dBi總量，等量減少最大傳導輸出功率及最大功率頻譜密度。
- (D) 固定式點對點操作，不包括點對多點系統、全方向性應用及多台共站發射機傳送相同資訊。

(4) 供用戶端裝置(Client Device)操作使用：

- (A) 最大傳導輸出功率應小於或等於250 mW。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於11 dBm。
- (C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

使用頻率於5.25 GHz~5.35 GHz 與5.470 GHz~5.725 GHz 頻段

- (1) 最大傳導輸出功率應小於或等於250 mW或 $11\text{dBm}+10\log B$ (B是26 dB發射頻寬，單位MHz)之較小者。
- (2) 最大功率頻譜密度在任何1 MHz 頻帶中應小於或等於11 dBm。
- (3) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

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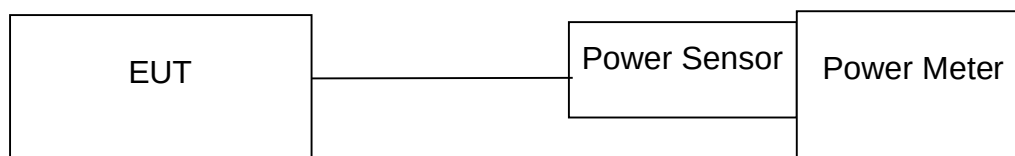
使用頻率於5.725 GHz~5.850 GHz 頻段

- (1) 最大傳導輸出功率應小於或等於1 W。
- (2) 在任何500 kHz 頻帶中最大功率頻譜密度應小於或等於30 dBm。
- (3) 供固定式點對點操作時，使用方向增益超過6 dBi 之發射天線，可不需對應減少發射器之傳導輸出功率限制值。
- (4) 除(3)外，使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的 dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

9.2 測試方法

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Set the offset $10 \cdot \log(1/x)$ ($x=0.99$), 0.04 approximately
4. Record the max. reading.
5. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

9.3 輸出功率之測試配置



9.4 量測儀器設備

同本報告 4.3 節傳導配置圖

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9.5 輸出功率之量測結果

802.11a_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	6	17.13	51.631	23.98 or 11+10log(B) = 24.86	PASS
60	5300	6	17.28	53.445	23.98 or 11+10log(B) = 24.81	PASS
64	5320	6	17.15	51.869	23.98 or 11+10log(B) = 25.51	PASS
100	5500	6	8.17	6.560	23.98 or 11+10log(B) = 23.77	PASS
116	5580	6	17.21	52.590	23.98 or 11+10log(B) = 25.45	PASS
140	5700	6	6.51	4.476	23.98 or 11+10log(B) = 23.77	PASS
144	5720(U-NII 2C)	6	15.48	35.31	23.98 or 11+10log(B) = 25.77	PASS
144	5720 (U-NII 3)	6	12.47	17.65	30	PASS

802.11n_HT20_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	MCS0	17.13	51.625	23.98 or 11+10log(B) = 25.43	PASS
60	5300	MCS0	17.12	51.506	23.98 or 11+10log(B) = 25.37	PASS
64	5320	MCS0	14.31	26.969	23.98 or 11+10log(B) = 24.85	PASS
100	5500	MCS0	8.35	6.837	23.98 or 11+10log(B) = 23.96	PASS
116	5580	MCS0	17.28	53.439	23.98 or 11+10log(B) = 25.77	PASS
140	5700	MCS0	6.86	4.851	23.98 or 11+10log(B) = 23.97	PASS
144	5720(U-NII 2C)	MCS0	15.54	35.79	23.98 or 11+10log(B) = 25.77	PASS
144	5720 (U-NII 3)	MCS0	12.53	17.90	30	PASS

802.11n_HT40_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	MCS0	14.85	30.516	23.98 or 11+10log(B) = 27.67	PASS
62	5310	MCS0	11.89	15.436	23.98 or 11+10log(B) = 27.02	PASS
102	5510	MCS0	5.16	3.277	23.98 or 11+10log(B) = 26.99	PASS
110	5550	MCS0	14.81	30.236	23.98 or 11+10log(B) = 27.57	PASS
134	5670	MCS0	11.06	12.751	23.98 or 11+10log(B) = 27.06	PASS
142	5710(U-NII 2C)	MCS0	14.21	26.34	23.98 or 11+10log(B) = 27.11	PASS
142	5710 (U-NII 3)	MCS0	6.06	4.04	30	PASS

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802.11ac_VHT80_Ch0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
58	5290	MCS0	10.84	12.147	23.98 or $11+10\log(B) = 30.18$	PASS
106	5530	MCS0	11.00	12.603	23.98 or $11+10\log(B) = 30.11$	PASS
122	5610	MCS0	10.90	12.316	23.98 or $11+10\log(B) = 30.11$	PASS
138	5690(U-NII 2C)	MCS0	10.72	11.79	23.98 or $11+10\log(B) = 30.11$	PASS
138	5690 (U-NII 3)	MCS0	-0.47	0.90	30	PASS

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10 功率密度之限制

10.1 適用標準

依據NCC低功率射頻電機技術規範4.7.3節之要求，使用於5.15 GHz~5.25 GHz 頻段

(1) 供戶外操作使用：

- (A) 最大傳導輸出功率應小於或等於1 W。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於17 dBm。
- (C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。
- (D) 在水平面仰角超過30 度時，其最大EIRP 應小於或等於21 dBm。

(2) 供室內操作使用：

- (A) 最大傳導輸出功率應小於或等於1 W。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於17 dBm。
- (C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

(3) 供固定式點對點操作使用：

- (A) 最大傳導輸出功率應小於或等於1 W。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於17 dBm。
- (C) 使用超過23 dBi方向增益之指向性天線時，應依超過23 dBi天線方向增益的dBi總量，等量減少最大傳導輸出功率及最大功率頻譜密度。
- (D) 固定式點對點操作，不包括點對多點系統、全方向性應用及多台共站發射機傳送相同資訊。

(4) 供用戶端裝置(Client Device)操作使用：

- (A) 最大傳導輸出功率應小於或等於250 mW。
- (B) 在任何1 MHz 頻帶中最大功率頻譜密度應小於或等於11 dBm。
- (C) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

使用頻率於5.25 GHz~5.35 GHz 與5.470 GHz~5.725 GHz 頻段

- (1) 最大傳導輸出功率應小於或等於250 mW或11dBm+10log B (B是26 dB發射頻寬，單位MHz)之較小者。
- (2) 最大功率頻譜密度在任何1 MHz 頻帶中應小於或等於11 dBm。
- (3) 使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

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使用頻率於5.725 GHz~5.850 GHz 頻段

- (1) 最大傳導輸出功率應小於或等於1 W。
- (2) 在任何500 kHz 頻帶中最大功率頻譜密度應小於或等於30 dBm。
- (3) 供固定式點對點操作時，使用方向增益超過6 dBi 之發射天線，可不需對應減少發射器之傳導輸出功率限制值。
- (4) 除(3)外，使用超過6 dBi 方向增益之發射天線時，應依超過6 dBi 天線方向增益的 dBi 總量，等量減少最大傳導輸出功率及最大功率頻譜密度。

10.2 測試方式

將發射機之天線埠經由適當之衰減直接連至測試儀器。找出發射峰值並擴展於通帶內，設定解析頻寬為 1 MHz，視訊頻寬大於解析頻寬，掃描時間為頻率掃描範圍除以 1 MHz。

10.3 測試配置

同本報告 8.3 節傳導配置圖

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10.4 功率密度量測結果

POWER DENSITY 802.11a MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5260.00	1.93	0.19	2.12	11.00	-8.88
5300.00	2.22	0.19	2.41	11.00	-8.59
5320.00	3.07	0.19	3.26	11.00	-7.74
5500.00	-2.02	0.19	-1.83	11.00	-12.83
5580.00	3.37	0.19	3.56	11.00	-7.44
5700.00	-2.15	0.19	-1.96	11.00	-12.96
5720 (U-NII 2C)	4.19	0.19	4.38	11.00	-6.62
5720 (U-NII 3)	-0.02	0.19	0.17	30.00	-29.83

POWER DENSITY 802.11n HT20 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5260	1.02	0.19	1.21	11	-9.79
5300	1.75	0.19	1.94	11	-9.06
5320	3.78	0.19	3.97	11	-7.03
5500	-5.26	0.19	-5.07	11	-16.07
5580	3.06	0.19	3.25	11	-7.75
5700	-3.27	0.19	-3.08	11	-14.08
5720 (U-NII 2C)	3.74	0.19	3.93	11	-7.07
5720 (U-NII 3)	-0.03	0.19	0.16	30	-29.84

POWER DENSITY 802.11n HT40 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5270	-2.79	0.39	-2.40	11	-13.40
5310	-2.4	0.39	-2.01	11	-13.01
5510	-8.33	0.39	-7.94	11	-18.94
5550	-2.02	0.39	-1.63	11	-12.63
5670	-1.11	0.39	-0.72	11	-11.72
5710 (U-NII 2C)	-3.28	0.39	-2.89	11	-13.89
5710 (U-NII 3)	-8.88	0.39	-8.49	30	-38.49

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POWER DENSITY 802.11ac VHT80 MODE_Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)
5290	-9.87	0.75	-9.12	11	-20.12
5530	-9.10	0.75	-8.35	11	-19.35
5610	-9.54	0.75	-8.79	11	-19.79
5690 (U-NII 2C)	-11.11	0.75	-10.36	11	-21.36
5690 (U-NII 3)	-18.17	0.75	-17.41	30	-47.41

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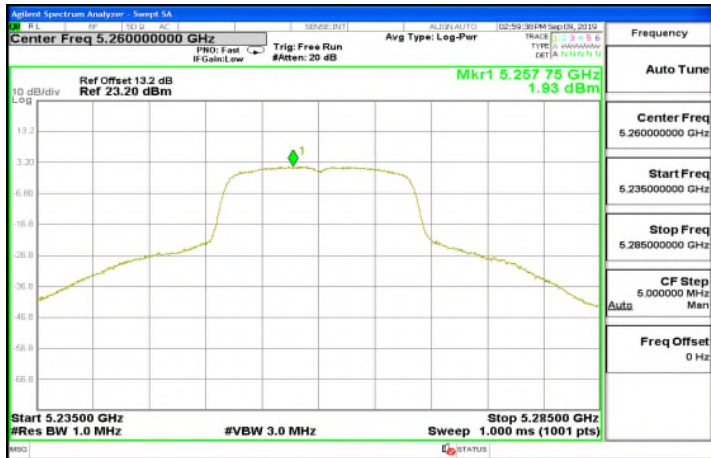
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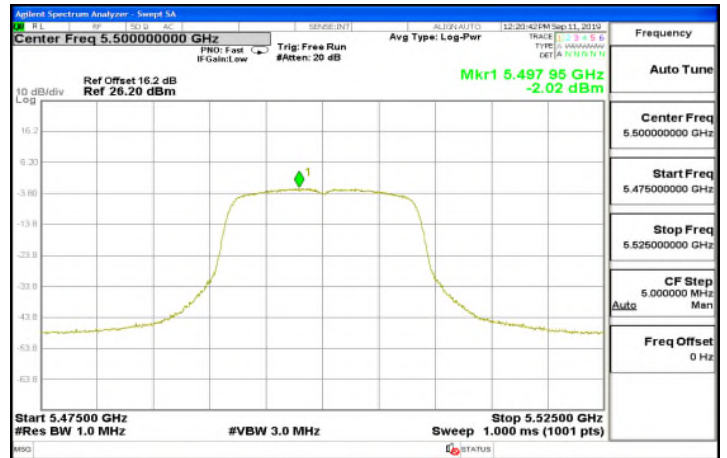
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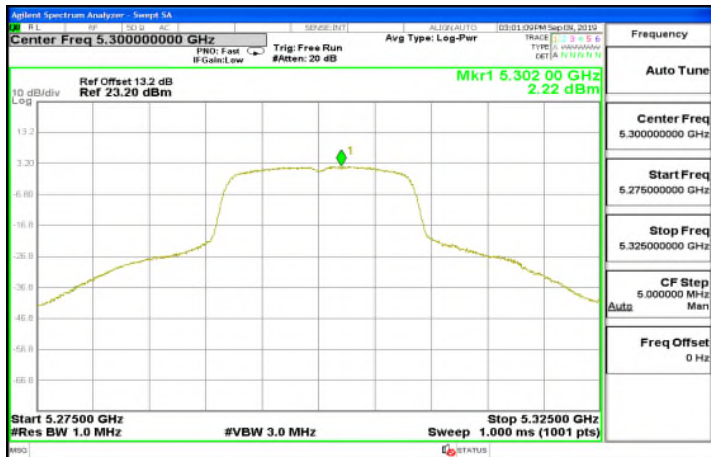
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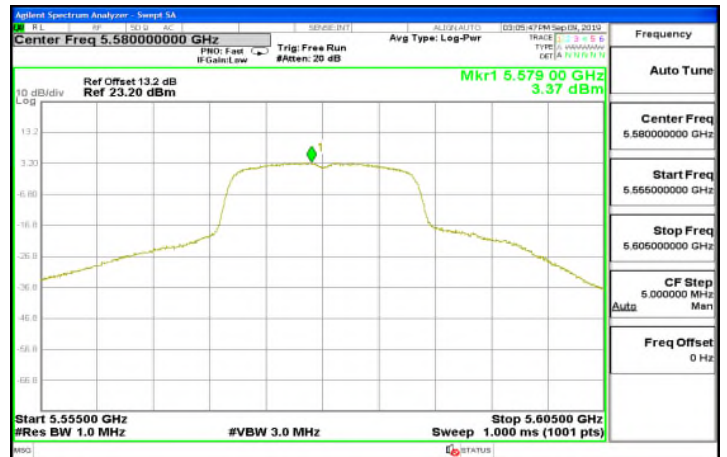
802.11a_20MHz_5500MHz



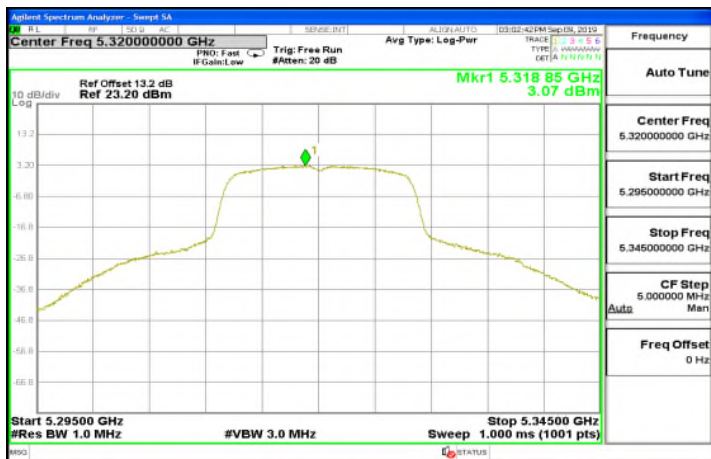
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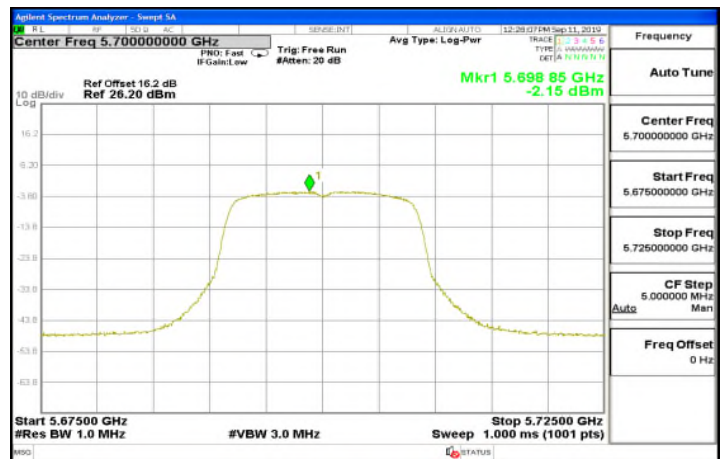
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802.11a_20MHz_5320MHz



802.11a_20MHz_5700MHz

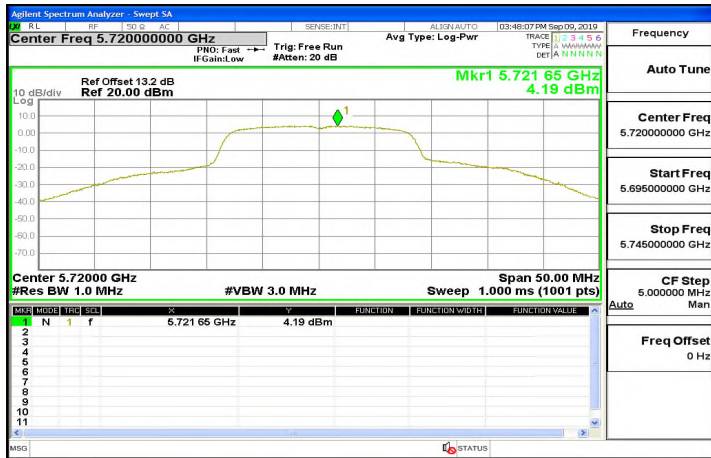


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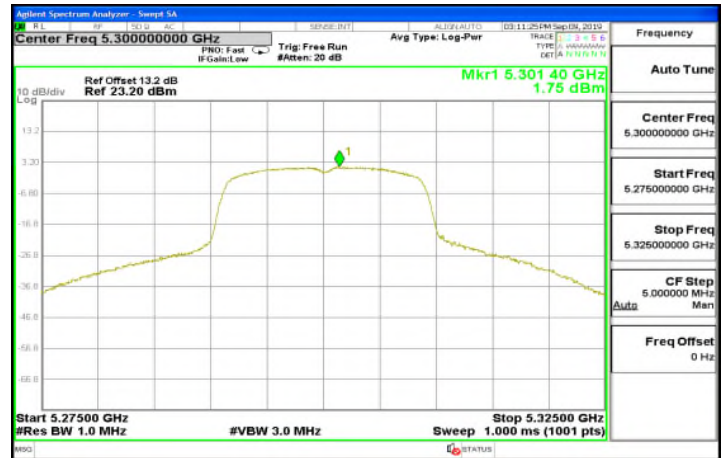
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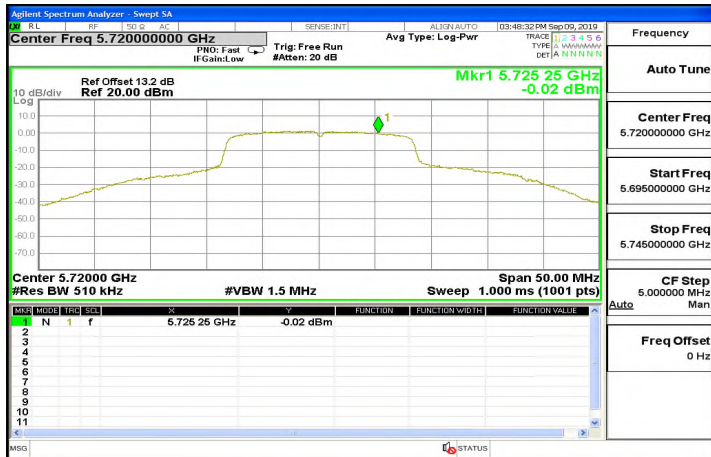
802.11a_20MHz_5720MHz_UNII 2C



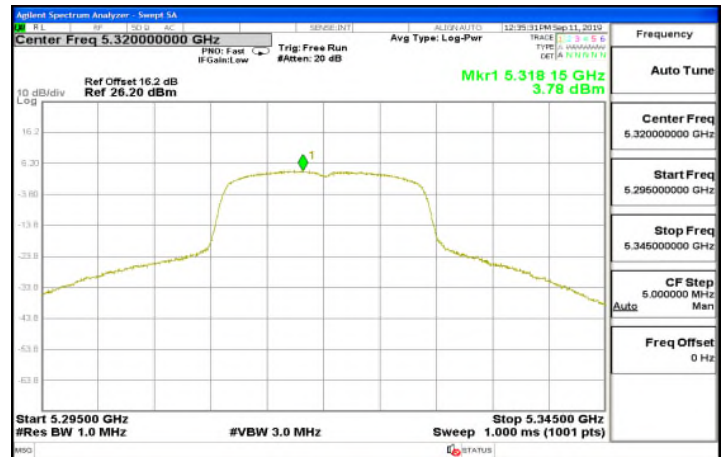
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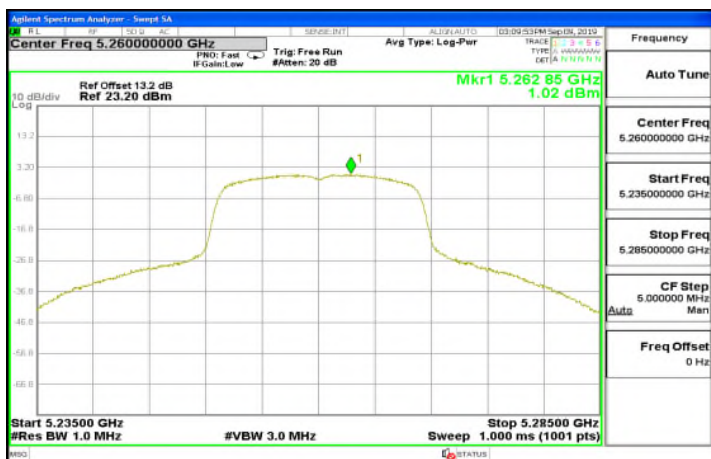
802.11a_20MHz_5720MHz_UNII 3



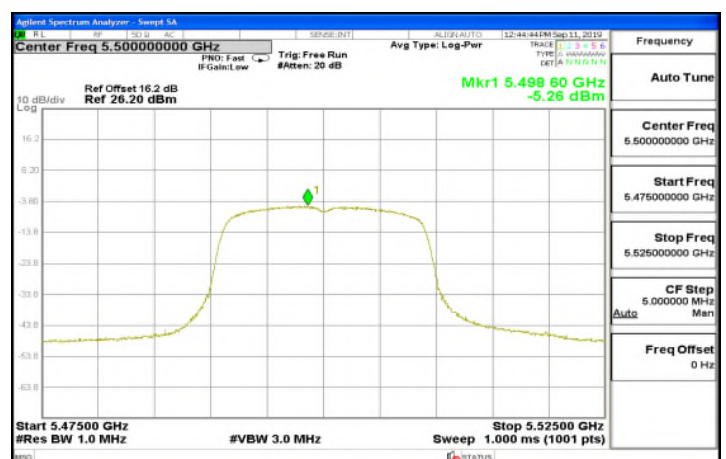
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802.11n_20MHz_5260MHz



802.11n_20MHz_5500MHz

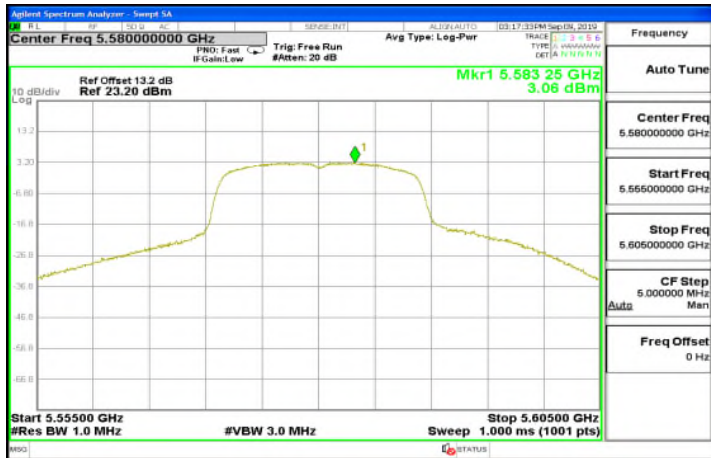


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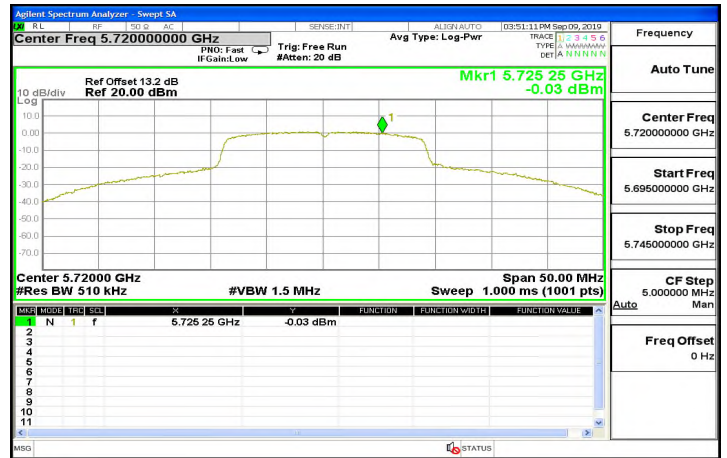
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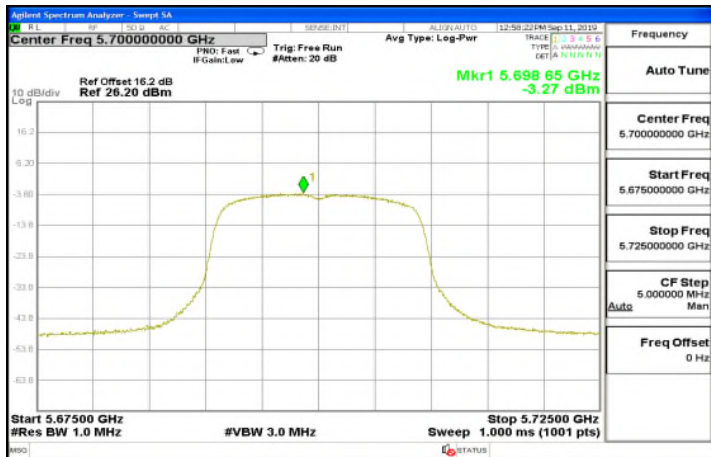
802.11n_20MHz_5580MHz



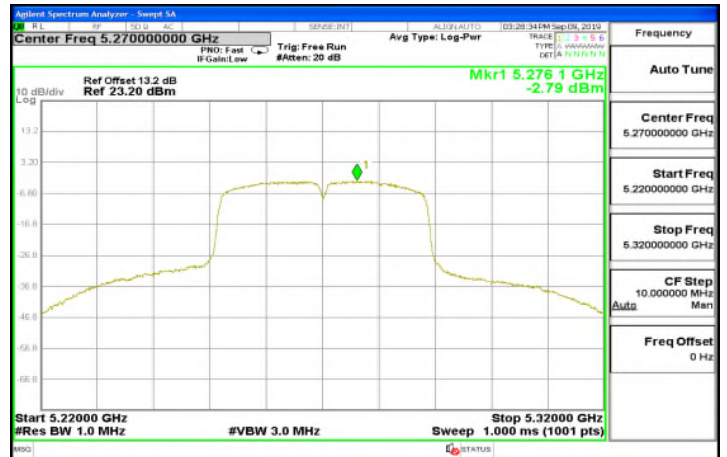
802.11n_20MHz_5720MHz_UNII 3



802.11n_20MHz_5700MHz



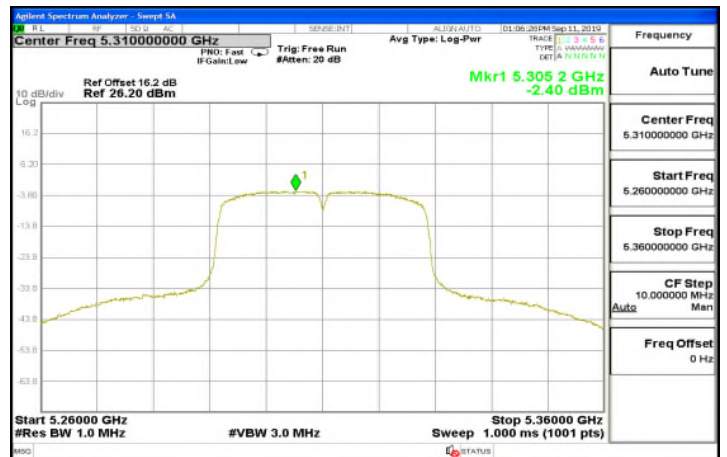
802.11n_40MHz_5270MHz



802.11n_20MHz_5720MHz_UNII 2C



802.11n_40MHz_5310MHz

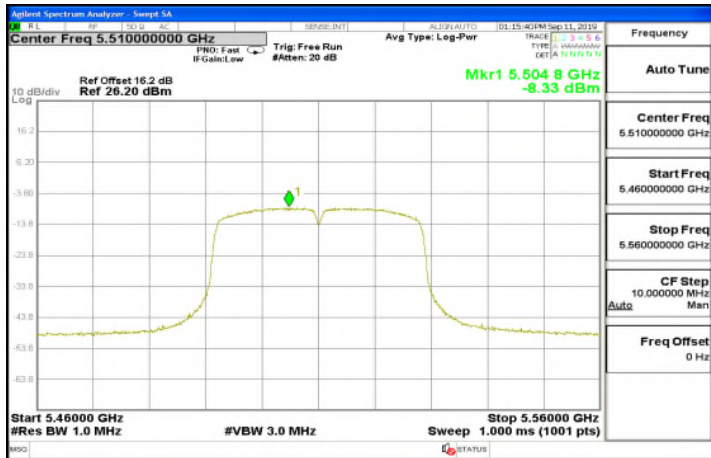


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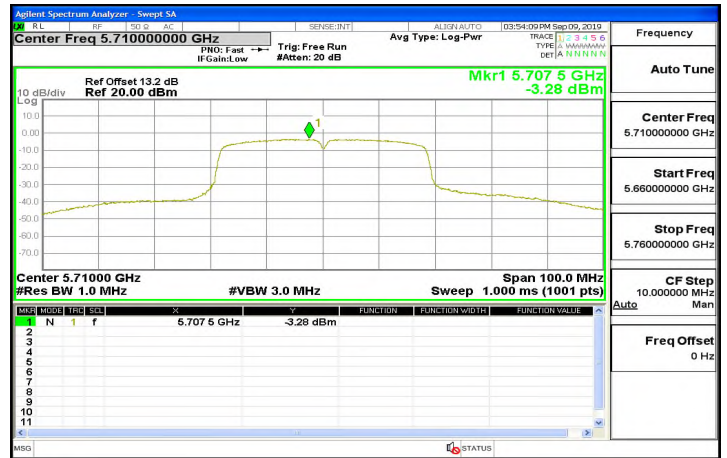
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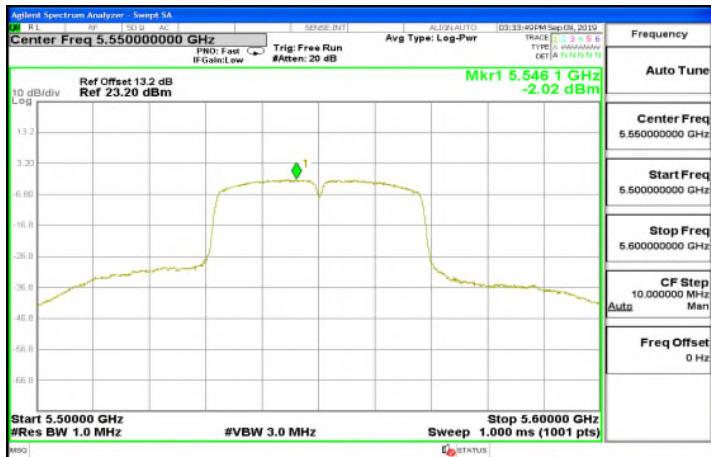
802.11n_40MHz_5510MHz



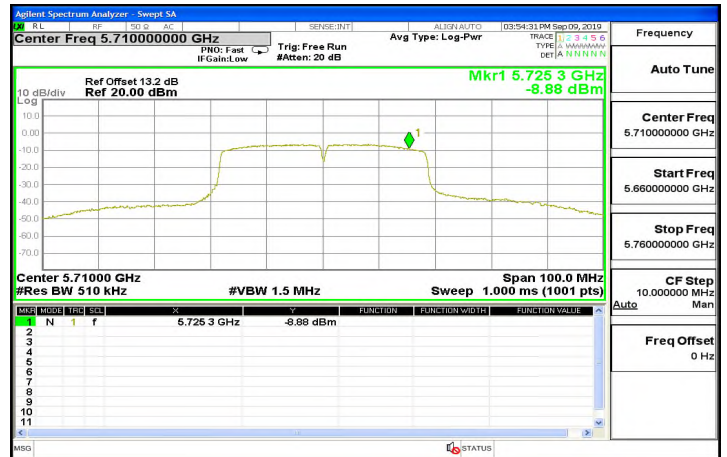
802.11n_40MHz_5710MHz_UNII 2C



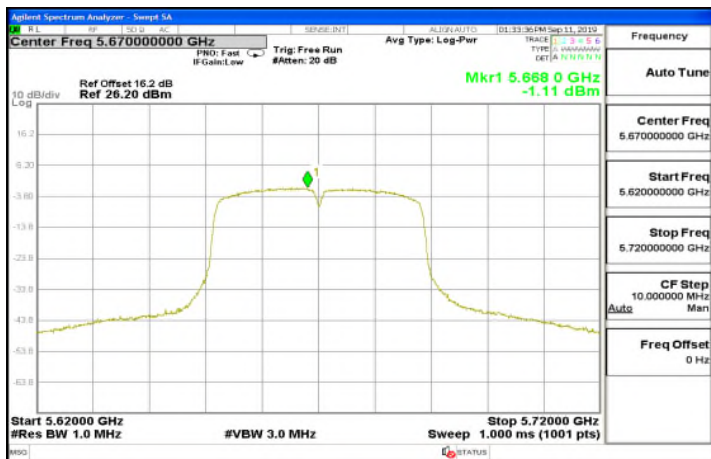
802.11n_40MHz_5550MHz



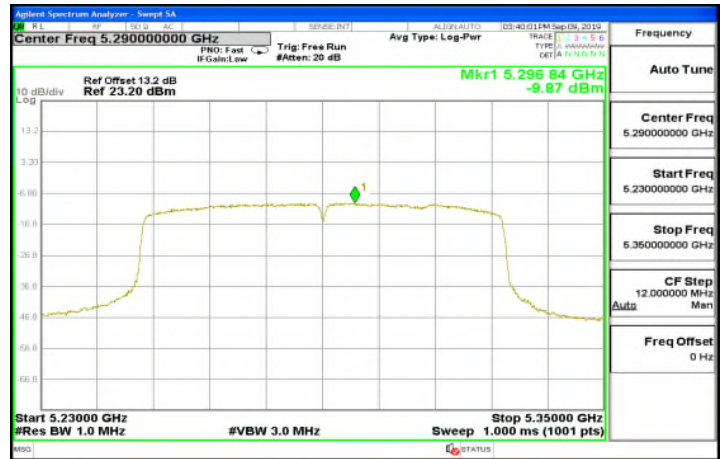
802.11n_40MHz_5710MHz_UNII 3



802.11n_40MHz_5670MHz



802.11ac_80MHz_5290MHz

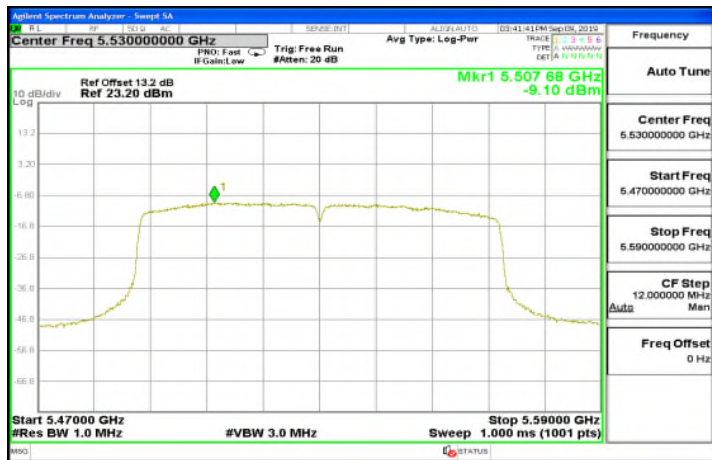


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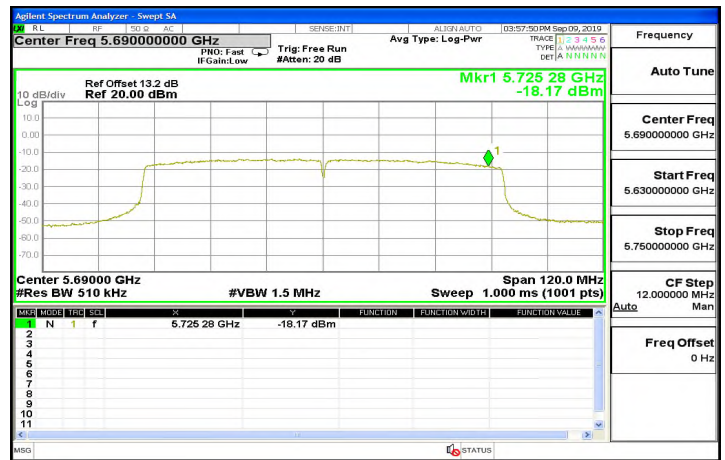
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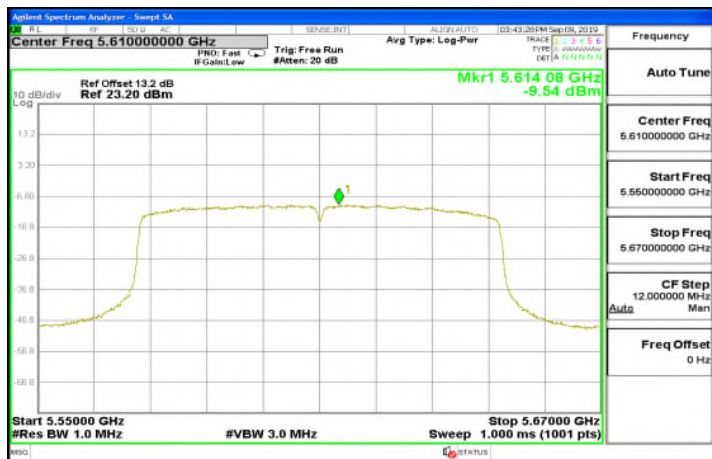
802.11ac_80MHz_5530MHz



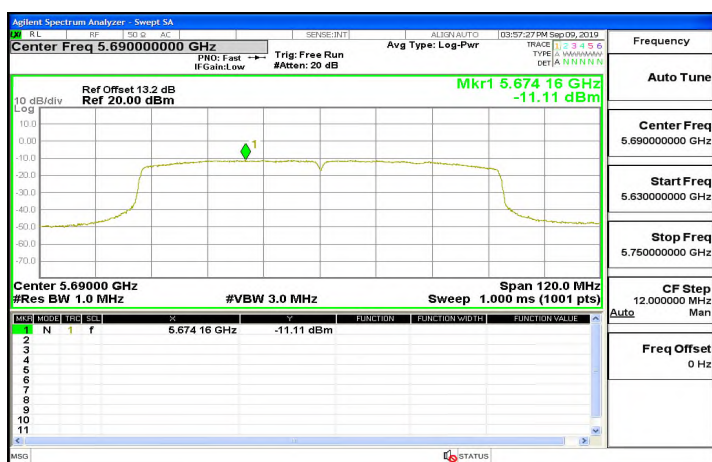
802.11ac_80MHz_5690MHz_UNII 3



802.11ac_80MHz_5610MHz



802.11ac_80MHz_5690MHz_UNII 2C



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~ End of Report ~

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